

**Deep River/ Turkey Creek Watershed Plan**  
**City of Hobart, Indiana**  
**--Final Plan--**  
**June 2002**

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## **I. Introduction**

### **Study Area**

The Deep River/ Turkey Creek watershed, identified as hydrologic unit coded (HUC) watershed 04040001030, covers a drainage area of approximately 124 square miles in northwestern Indiana, of which 104 square miles are located in Lake County, and 20 square miles are located in Porter County. The Deep River watershed covers a drainage area of 79.4 square miles and the Turkey Creek watershed covers a drainage area of 38.3 square miles. An additional 6.3 square miles drain directly to Lake George (Hoggatt, 1975).

As illustrated in **Figure 1-1**, Turkey Creek and its tributaries drain the northwestern part of the watershed into the upper end of Lake George. Deep River and its major tributaries, Beaver Dam Ditch and Niles Ditch, drain the southern and eastern parts of the watershed before flowing into Lake George. Deep River flows through Lake George and continues through Hobart, Lake Station, and East Gary, Indiana, draining the Deep River/ Turkey Creek watershed into Burns Ditch. A majority of the major stream channels in the area are no longer in a natural state, as all have undergone stream channel alteration and many have been completely constructed or reconstructed for drainage purposes.

In addition to Deep River and Turkey Creek, the other significant water feature within the study area is Lake George, which is located within the City of Hobart. Lake George is a manmade lake that was created by the damming of Deep River circa 1840 by George Earle for a gristmill and community water supply. Today, Lake George is considered to be the central feature in the City of Hobart and has been the focus of significant downtown revitalization and economic development initiatives for the community.

Lake George, as well as the majority of the City of Hobart, is located within the Deep River-Lake George Dam hydrologic unit (HUC 04040001030060), which covers approximately 12,879.1 acres in portions of Lake and Porter Counties in northwest Indiana (See **Figure 1-1**). This HU is a subwatershed of the greater Deep River/ Turkey Creek watershed (HUC 04040001030), which encompasses approximately 79,433.7 acres.

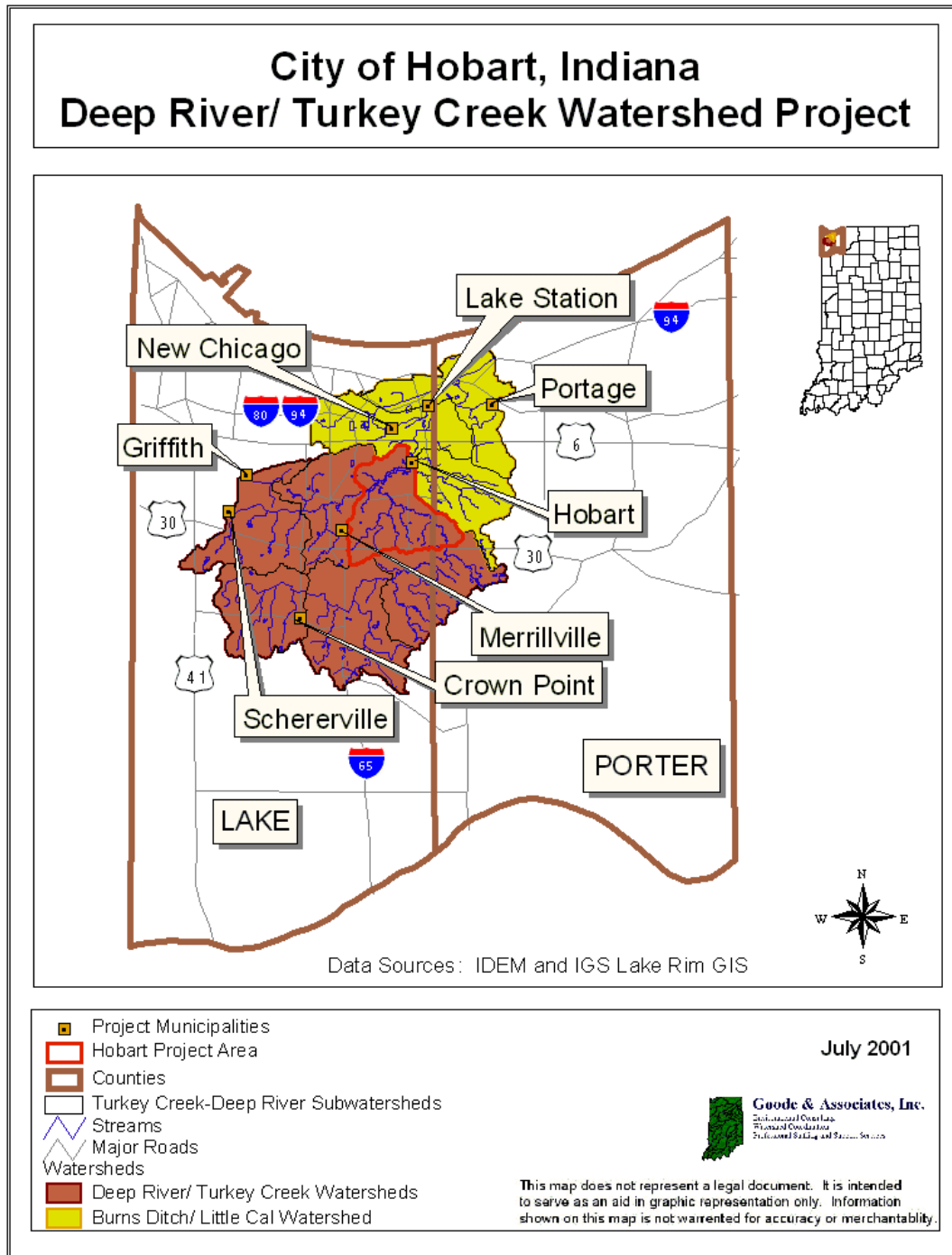
The Deep River/ Turkey Creek watershed encompasses areas of diverse land uses including significant agricultural areas in the southern portion of the watershed to predominately urban areas in the northern portion of the watershed. This region includes the communities of Hobart, Merrillville, Crown Point, and Winfield, Indiana, as well as touching upon small portions of other communities in

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the area, such as Griffith, Schererville, Gary, Portage, New Chicago, and Lake Station.

**Figure 1-1: Deep River/ Turkey Creek Watershed**



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**Evolution of Watershed Planning Efforts for Lake George, Deep River, and Turkey Creek**

In the late 1980's, the City of Hobart, in partnership with a local private economic development organization, began a program to improve the community's quality of life and retain and expand business within the City that resulted in a multi-phased lakefront development and downtown revitalization plan. As the central natural feature in the City of Hobart, Lake George became the focus of this partnership, which has resulted in the conversion of a lakeside dump and landfill into what is now known as Festival Park. In 1988, Festival Park was dedicated as part of a community wide festival that was the precursor to Hobart's annual Lakefront Festival. In addition, in 1990, a footbridge was built over the Lake George dam to connect Festival Park to downtown Hobart and other planned lakeside improvement projects.

In a continuing focus on revitalization of Lake George, the City of Hobart received several grants from the Indiana Department of Natural Resources (IDNR), as well as the Indiana Department of Transportation (INDOT), to help construct Phase II of the City's lakefront development plan, Lakefront Park. In addition, the City's first ever park bond was issued to supplement these grants in conjunction with generous private donations. In 1997, Lakefront Park was completed as a complementary extension to Festival Park (See **Figure 1-2**).

The lakefront park system now consists of brick pathways that were built on top of a three block long sea wall that was installed to expand the available parkland. New public parking areas were created behind downtown businesses and a fishing pier with gazebo clock tower, benches, and decorative lighting were also included in the Lakefront Park improvements. The project also added a covered bridge over the lake's dam, a boat launch and a canoe portage, and an entrance plaza with a fountain and a bandshell. These projects were all constructed in conjunction with installation of sea walls to control the lakeshore erosion that was becoming prevalent along the northeast shoreline of Lake George.

In the early 1990's, degrading water quality, recreational uses, and aesthetic issues began to pose a threat to the community's investments in lakefront and downtown revitalization efforts as a growing sedimentation problem in Lake George was becoming obvious. In many areas Lake George had filled with sediments from a historical average depth of 6-8 feet to an average depth of 1-3 feet. Accumulating sediments were precluding the use of the lake as a recreational resource for boating, degrading habitat for biological communities, and reducing recreational fishing opportunities in the lake. In addition, overgrowing plant life began to cause an aesthetic nuisance to lake residents and recreational enthusiasts.

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**Figure 1-2: City of Hobart, Indiana, Lakefront Park Area**



As the result of community concerns, in 1993 the U.S. Army Corps of Engineers (USACE), Chicago District, initiated an extensive evaluation of Lake George and its major tributaries and later published a 1995 Planning/ Engineering feasibility report for the dredging of Lake George. This report was developed to determine the technical and economic feasibility for “removal of silt, aquatic growth, and other material and construction of silt traps or other devices to prevent and abate the deposit of sediment in Lake George” (USACE).

In this study, the Army Corp concluded that Lake George had “trapped large quantities of fine sediment from upstream agricultural areas, reducing water depths, making the lake bottom softer and the water murkier.” In addition, the report noted that “Lake George has filled in with sediments, most likely from intensive agricultural production and development construction” and later concluded that “Lake residents are not happy with these conditions, as they interfere with boating, swimming, fishing and clarity of the lake” (USACE).

The USACE report determined that the dredging of Lake George was feasible and economically viable. Consequently, in the spring of 2000 the City of Hobart proceeded with a limited dredging project for the lake. Although dredging was limited from the extent of the original project proposal due to costs and wetland regulations, by the fall of 2000 the City had successfully removed more than 590,000 cubic yards of sediment from Lake George; however, the project was

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completed at a cost of more than two million dollars to the City of Hobart's taxpayers. These monies had been included in the \$3.8 million dollar park bond that had also funded development of Lakefront Park.

Since the success of the Lake George dredging project was achieved at a high cost to the community, officials with the City of Hobart began to evaluate potential options for protecting their public investments in the lake. As the City began to consider these options, it became apparent that in order to address the sediment loads to Lake George from the upstream tributaries of Deep River and Turkey Creek, there would be far reaching implications to achieving the desired reductions in sediment loadings.

Compounding the difficulties associated with reducing the introduction of sediments into Lake George is the fact that the City of Hobart lies within a predominantly urban landscape. Its municipal boundaries border the neighboring communities of Gary, Merrillville, Lake Station, New Chicago, Portage, and unincorporated portions of Lake and Porter County. In addition, the Deep River and Turkey Creek watersheds that drain into Lake George, although dominated by urban landscapes in some reaches, are also largely impacted by significant portions of agricultural land uses.

Consequently, it was very apparent to officials at the City of Hobart that managing their water resource needs would be complex and challenging due to the variety of urban landscapes, multiple political jurisdictions, and upstream farming practices that were providing significant contributions to local water quality problems.

### **319 Grant**

In the fall of 2000, the City of Hobart applied to the Indiana Department of Environmental Management (IDEM) for a Section 319 Watershed Management Grant. During the summer of 2001, the City entered in to a contractual agreement with IDEM, and received 319 funding to begin the development of a Watershed Management Plan for Lake George and its watershed.

The City of Hobart began formal watershed planning activities by forming a steering committee for the project, composed of a variety of stakeholders from throughout the Deep River/ Turkey Creek watershed. The following table lists the board members selected to guide this project.

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**Table 1-1: Watershed Plan Steering Committee Members**

Salutation	First Name	Last Name	Representing
Mr.	Jeff	Greiner	Greiner Enterprises
Mr.	Greg	Bright	Indiana Lakes Management Society
Mr.	Pete	Julovich	Community Stakeholder
Ms.	Sandy	O'Brien	Community Stakeholder
Mr.	Craig	Zandstra	Lake County Parks Department
Mr.	Matt	Jarvis	IDEM/ NRCS
Mr.	Jeff	Ban	Crown Point City Engineer
Mr.	Stanley	Dobosz	Council Member, Town of Griffith
Mr.	George	Van Til	Lake County Surveyor
Mr.	Kevin	Breitzke	Porter County Surveyor
Mr.	Shawn	Pettit	Director of Operations, Town of Schererville
Mr.	Jerry	Kousen	Science Teacher, Hobart High School
Mr.	Steve	Fralish	Lake Station City Engineer
Mr.	Robert	Ellenberger	Council Member, City of Hobart
Ms.	Denarie	Kane	Director of Development, City of Hobart
Mr.	Taghi	Arshami	Planning Director, City of Gary
Mr.	Tris	Miles	Merrillville Town Engineer
Mr.	Craig	Hendrix	Portage City Engineer
Mr.	Steve	Truchan	Hobart City Engineer
Mr.	Chuck	Walker	Lake Co. District Conservationist
Mr.	Ron	Trigg	Shirley Heinze Environmental Fund

On August 29, 2001, the City of Hobart hosted its first public meeting to discuss the 319 grant received by the City and reviewed the City's goals for developing a watershed management plan. The Steering Committee members then shared their goals for the project and opened discussion with the public in order to develop a more broad sense of the water quality concerns and goals of the stakeholders in the project. After a series of discussions, the following water quality and land use concerns were identified as issues that needed to be addressed in the project:

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**Table 1-2: Water Quality Concerns**

Contaminated sediments in Lake George
Drinking water protection
Effects of development on water quality, especially erosion and sedimentation
Expansion of local wastewater treatment plants
Failing septic systems
Illegal discharges
Impact of wildlife on water quality (geese/ ducks)
Lack of general public and school water quality education programs
Lack of local water quality monitoring data
Lack of recreational uses of Lake George, Deep River, and Turkey Creek
Need for consistency as Stormwater Management Programs (SW Phase II)
Preservation of critical lands that provide water quality benefits, especially wetlands
Public health implications of increasing public access to Lake George, Deep River, and Turkey Creek for recreational boating and canoeing
Public health implications of swimming in Lake George, Deep River, and Turkey Creek
Sedimentation in Lake George and downstream portions of Deep River/ Burns Ditch
Water quality impacts of diminishing native plants, animals, landscapes, i.e. ETR species

As a result of the concerns discussed by the Steering Committee and other stakeholders in the project, the committee decided on the following mission and goals for the project:

**Mission:** To minimize the introduction of sediment and other pollutants into Lake George by addressing local NPS issues and developing partnerships with neighboring communities, businesses, agricultural producers, and interested stakeholders.

**Goals:**

- Protect Lake George from future sediment and water quality impairments
- Improve water quality in Deep River/ Turkey Creek watersheds, upstream of Lake George
- Improve water quality education throughout the watershed
- Eliminate illegal discharges/ failing septic systems
- Promote consistency among communities developing stormwater programs

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With a clear mission statement and goals in mind, the Steering Committee decided to establish two subcommittees to facilitate effective information gathering and decision making for the project. The subcommittees and the responsibilities were established as follows:

- **Technical Subcommittee** – The technical committee consisted of the stakeholders interested in guiding the development of the surface water quality monitoring program. This committee was responsible for deciding upon the parameters to be monitored by the project team and for recommending monitoring locations within the watershed. This committee was also responsible for identifying and providing data sources that would be used by the project team to document current and historical water quality impairments and threats within the watershed.

**Table 1-3: Technical Subcommittee Members**

Salutation	First Name	Last Name	Representing
Mr.	Doris	Blaney	Community Stakeholder
Mr.	Kevin	Breitzke	Porter County Surveyor
Mr.	Greg	Bright	Indiana Lakes Management Society
Mr.	Dan	Fleming	Porter County SWCD/ NW Territory RC&D
Mr.	Steve	Fralish	Lake Station City Engineer
Ms.	Jennifer	Gadzala	NIRPC – Regional Planning Agency
Ms.	Marianne	Giolitto	J.F. New & Associates, Inc
Mr.	Stephen	Hall	Goode & Associates, Inc.
Mr.	Jeff	Janizek	Merrillville Stormwater Board
Mr.	Pete	Julovich	Community Stakeholder
Ms.	Louise	Karwowski	Community Stakeholder
Mr.	Jerry	Kousen	Hobart High School
Mr.	Carroll	Lewis	Community Stakeholder
Mr.	Joseph	Mladenik	Community Stakeholder
Ms.	Sandy	O'Brien	Community Stakeholder
Mr.	Larry	Shrader	Community Stakeholder
Mr.	Steve	Truchan	Hobart City Engineer

- **Land Use/ Planning Subcommittee** – The land use/ planning committee consisted primarily of the Lake and Porter County planning staff, surveyors, and regional planning authorities, as well as interested stakeholders from the

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community. In addition, this committee included municipal planning and engineering staff persons that were considered to be knowledgeable about the growth and development patterns within their respective communities. This committee was responsible for identifying environmentally sensitive areas where community and regional growth and development patterns were promoting development in close proximity to waterbodies with water quality impairments. In addition, the committee was responsible for providing information to the project team regarding each participating community's economic development strategies and incentive areas within the watershed so that the project team could identify situations where communities were promoting growth and development near environmentally sensitive areas.

**Table 1-4: Land Use/ Planning Subcommittee**

<b>Salutation</b>	<b>First Name</b>	<b>Last Name</b>	<b>Title</b>	<b>Representing</b>
Mr.	Taghi	Arshami	Planning Director	City of Gary
Mr.	Jeff	Ban	City Engineer	City of Crown Point
Mr.	Kevin	Breitzke	Surveyor	Porter County
Mr.	Dan	Fleming	Director	NW Territory RC&D
Mr.	Steve	Fralish	City Engineer	City of Lake Station
Ms.	Jennifer	Gadzala	Environmental Planner	NIRPC
Mr.	Jeff	Greiner	Director	Greiner Development
Mr.	Craig	Hendrix	City Engineer	City of Portage
Ms.	Janet	Herrick	Park Board President	Hobart Park Board
Ms.	Denarie	Kane	Director of Development	City of Hobart
Mr.	Tris	Miles	Town Engineer	Town of Merrillville
Ms.	Sandy	O'Brien	Community Stakeholder	
Mr.	Larry	Osterholz	Stormwater Specialist	DNR - Division of Soil Conservation
Mr.	Shawn	Pettit	Director of Operations	Town of Schererville
Mr.	Ron	Trigg	Executive Director	Shirley Heinze Environmental Fund
Mr.	Steve	Truchan	City Engineer	City of Hobart
Mr.	Chuck	Walker	District Conservationist	NRCS - Lake/ Porter Counties, Indiana
Mr.	Craig	Zandstra	Park Planner	Lake County Parks

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**Public Participation**

In order to continue encouraging participation by additional stakeholders, the City of Hobart developed press releases announcing all steering committee and subcommittee meetings as being open to the public and provided the press releases to local newspapers and media outlets for all committee and subcommittee meetings. All meetings for the project were open to the public. Examples of press releases that were developed for these public meetings are included in **Appendix 1-1**. In addition, the City of Hobart also produced articles for magazines that were published by the Indiana Lakes Management Society.

**Watershed Approach**

Although the study area for this project is focused on the Deep River/ Lake George (HU 04040001030060) watershed in Hobart, Indiana, participants in this planning effort recognized from the beginning that the water quality issues discussed within this plan could not be adequately addressed without significant actions to manage pollutant loads from the larger Deep River/ Turkey Creek watershed. Rather than limiting the focus and scope of this planning effort to developing specific recommendations for water quality improvements within the Deep River-Lake George watershed and the City of Hobart, this plan also provides additional recommendations for improving water quality throughout the larger Deep River/ Turkey Creek watershed and encourages the development of sub-watershed specific planning efforts.

In addition to understanding the fundamentals of watershed based planning, the project's Steering Committee inherently understood the challenges of working across multiple jurisdictions and the potential for generating "turf" issues. In order to minimize these potential obstacles and build stronger partnerships throughout the watershed, the group recognized that the planning effort would need to establish and maintain a "shared" leadership structure and a unifying approach to tackling watershed wide issues. Consequently, although the grant for this project was applied for and received by the City of Hobart, the Steering Committee decided to title the project "The Deep River/ Turkey Creek Watershed Plan" to embody a truly watershed based perspective and to avoid association with only a single municipality within the watershed.

## **II. Watershed Description & History**

### **Geologic History**

#### **Glaciation**

The geography of northwest Indiana is largely a product of the extreme climatological and geological events that have shaped the surficial geology and topography of the Lake Michigan Region.

The Wisconsin Age glaciers of the Pleistocene Epoch played the primary role in influencing the surficial geology of this region through several stages of glacial deposition and erosion. Due to general warming of the climate and intermittent periods of cooling that occurred between 25,000 and 14,000 years ago, the Lake Michigan lobe of the Wisconsin glacier experienced three major advances and retreats from its front edge, which was located near Indianapolis, Indiana about 25,000 years ago, to what is now the northern Lake County area within northwestern Indiana (DNR, 1994).

As a result of these major glacial advances and recessions, unconsolidated sediments cover the bedrock features present throughout Lake and Porter Counties. This glacial activity resulted in the deposition of three significant moraines consisting of ground up, eroded bedrock materials: the Valparaiso Moraine, the Tinley Moraine, and the Lake Michigan Border Moraine.

Within these moraines, the soil mantel covering the bedrock is typically 50 to 150 feet thick. Broad till plains and morainal deposits of finer grained soils are interrupted by outwash deposits and outwash plains consisting of more granular materials. Near Lake Michigan, dune and beach sand deposits, inland lake deposits and organic deposits are common, the result of poorly developed drainage systems.

#### **Ancient Lakes**

In addition to the glaciation of the Wisconsin Age, the coastal features of the ancient lakes (Lake Calumet, Lake Algonquin, Lake Chippewa, Lake Nipissing, etc.) continued to have significant impacts on the development of land topography and river channel formation, as well as the shaping of modern day Lake Michigan and other prominent coastal features of northern Indiana (DNR, 1994). These impacts were the result of the climatological warming trends of the period (13,000 to 2,000 years ago). During this period, lake levels experienced substantial changes in elevation due to the freezing and thawing of the northern glaciers. As a result, each major change in lake stage deposited or rearranged previous sedimentary deposits on top of glacially deposited moraine till materials.

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It is during this period that dunes became increasingly important landscape features.

**Bedrock**

Two principal features control regional bedrock structure in the Lake Michigan Region: the Kankakee Arch to the southwest and the Michigan Basin to the northeast. Sedimentary rocks dip away from the northern flank of the Kankakee Arch toward the Michigan Basin at an average rate of about 35 feet per mile (DNR, 1994).

Bedrock in the Deep River/ Turkey Creek watershed consists of Devonian and Mississippian shale and Devonian limestone and dolomite. The bedrock surface topography does not resemble the present surface topography, but has gentle relief and drains in a north or northeasterly direction (USGS, 1994).

**Natural History**

Pre-settlement conditions within Lake and Porter Counties in northwestern Indiana provided an incredible diversity of natural features and habitats for many different species of flora and fauna. Much of the original natural features of the region have been lost to development, with a few notable exceptions, such as the National Lakeshore, Dunes National Park, and the Hobart Prairie Grove.

For a period of approximately 3,000 years, beginning about 12,000 years ago, the rim region's ecosystem underwent a series of dramatic changes (Adams, 2000). As conditions became warmer and wetter, the ice-sheets of the Wisconsin glacial era retreated, transforming the newly exposed terrain into a cold, tundra-like region, seasonally laced with rapidly flowing streams of melt-water. This tundra in turn gave way to boreal forests dominated by spruce, fir and paper birch. As the climate continued to warm, these forests were transformed into mixed deciduous-coniferous forests dominated by oaks and white pine (AES, 2001, Petty and Jackson, 1966).

At the present time, Indiana's rim region is part of the "prairie peninsula" (Transeau, 1935). This region, which extends through Indiana as far east as Pennsylvania and as far south as Kentucky and Tennessee, consists of an archipelago of shifting prairie "islands" within a matrix of forest (AES, 2001).

What makes the rim region unique is the way in which Lake Michigan and the region's dune-swale topography has stratified these habitats. The interplay of grasslands and forests throughout the eastern United States typically assume chaotic, shifting, fractal configurations resembling ice on a pane of glass.

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Throughout the rim region, however, the plant communities are organized into relatively clear strata arranged on a north-south axis. A walk southward through an undisturbed portion of the Indiana's southern rim region would typically reveal the following succession of habitat: 1) beaches, which contain little or no rooted vegetation; 2.) fore-dunes and "blowouts", which are dominated by dune grasses, in particular *Ammophila*, and occasional shrubs such as beach plum. Beyond the dunes, later successional communities dominate, in particular black-oak savannas with periodic blowouts, prairie openings and stands of jack and white pine. Further south, the landscape is dominated by oak-hickory forests, which are periodically interrupted by swamps, marshes, bogs and other types of wetlands (AES, 2001).

### **Soils**

Three main types of surficial deposits are dominant in the Deep River/ Turkey Creek watershed portions of Lake and Porter Counties, Indiana: clean sands and associated still water deposits, clayey till and end moraine deposits of predominantly clayey soils, and granular soils, muck and marl associated with outwash deposits. The northern most third of the region lying adjacent to Lake Michigan and bordered on the south by U.S. 30 consists of beach sands, soft saturated clay and muck soils. The central portion of the County, south of U.S. 30 is predominantly silty clay glacial till with localized outwash and lacustrine deposits of muck and clay. The deposits of clay till found south of U.S. 30 are typically on the order of ten to twenty feet thick (US ACOE, 1995).

Soil associations in the Deep River/ Turkey Creek watershed are of four main types. The northern portion of the watershed is composed of two soil associations: the Alida-Del Rey-Whitaker association and the Plainfield-Watseka association. The Alida-Del Rey Whitaker association consists of nearly level and somewhat poorly drained lands with moderately coarse textured and medium textured soils that formed in glacial outwash and lake sediments. The Plainfield-Watseka association consists of moderately sloping to nearly level lands with excessively to somewhat poorly drained soils that formed in the coarse-textured glacial outwash (USDA, SCS, 1971).

The southern portion of the watershed is also composed of two soil associations: the Morley-Blount-Pewamo association and the Elliott-Markham-Pewamo association. The Morley-Blount-Pewamo association consists of steep to nearly level lands that are moderately well drained to poorly drained soils that formed in moderately fine textured glacial till. The Elliott-Markham-Pewamo association consists of nearly level and gently sloping lands that are well drained to poorly drained soils that formed in moderately fine textured glacial till (USDA, SCS, 1971).

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**Highly Erodible Lands (HEL)**

The Natural Resources Conservation Service (NRCS) uses the soil erodibility index (EI) to provide a numerical expression of the potential for a soil to erode considering the physical and chemical properties of the soil and the climatic conditions where it is located. As a result, the basis for identifying highly erodible land is the erodibility index of a soil map unit.

The erodibility index of a soil is determined by dividing the potential erodibility for each soil by the soil loss tolerance (T) value established for the soil. The T value represents the maximum annual rate of soil erosion that could take place without causing a decline in long-term productivity. The higher the index value, the greater the investment needed to maintain the sustainability of the soil resource base if intensively cropped (See **Figure 2-1**). Erodibility index scores equal to or greater than 8 are considered to be highly erodible land (NRI, 1992).

Highly erodible lands within the Deep River/ Turkey Creek watershed are primarily associated with the Morley-Blount-Pewamo soil associations. The following soils are considered to have HEL classifications in Lake and Porter Counties:

**Table 2-1: U.S. Department of Agriculture, Lake Co. Highly Erodible Lands**

<b>Symbol</b>	<b>Component Name</b>	<b>HEL Classification</b>	<b>Slope Length</b>	<b>% Slope</b>
MuB	Morley	1	200	4
MuC2	Morley	1	200	9
MuD2	Morley	1	150	15
MuE	Morley	1	150	21
MvB3	Morley	2	200	4
MvC3	Morley	1	200	9
MvE3	Morley	1	150	21
OaE	Oakville	2	100	18
OsB	Oshtemo	2	250	4
OsC	Oshtemo	2	200	9
PIC	Plainfield	2	100	9
TcB	Tracy	2	350	4
TcC	Tracy	1	250	9
TrB	Tracy	2	350	4

Although the NRCS is scheduled to complete a GIS based digital soil survey in the next 5 years that will allow for more accurate mapping of highly erodible

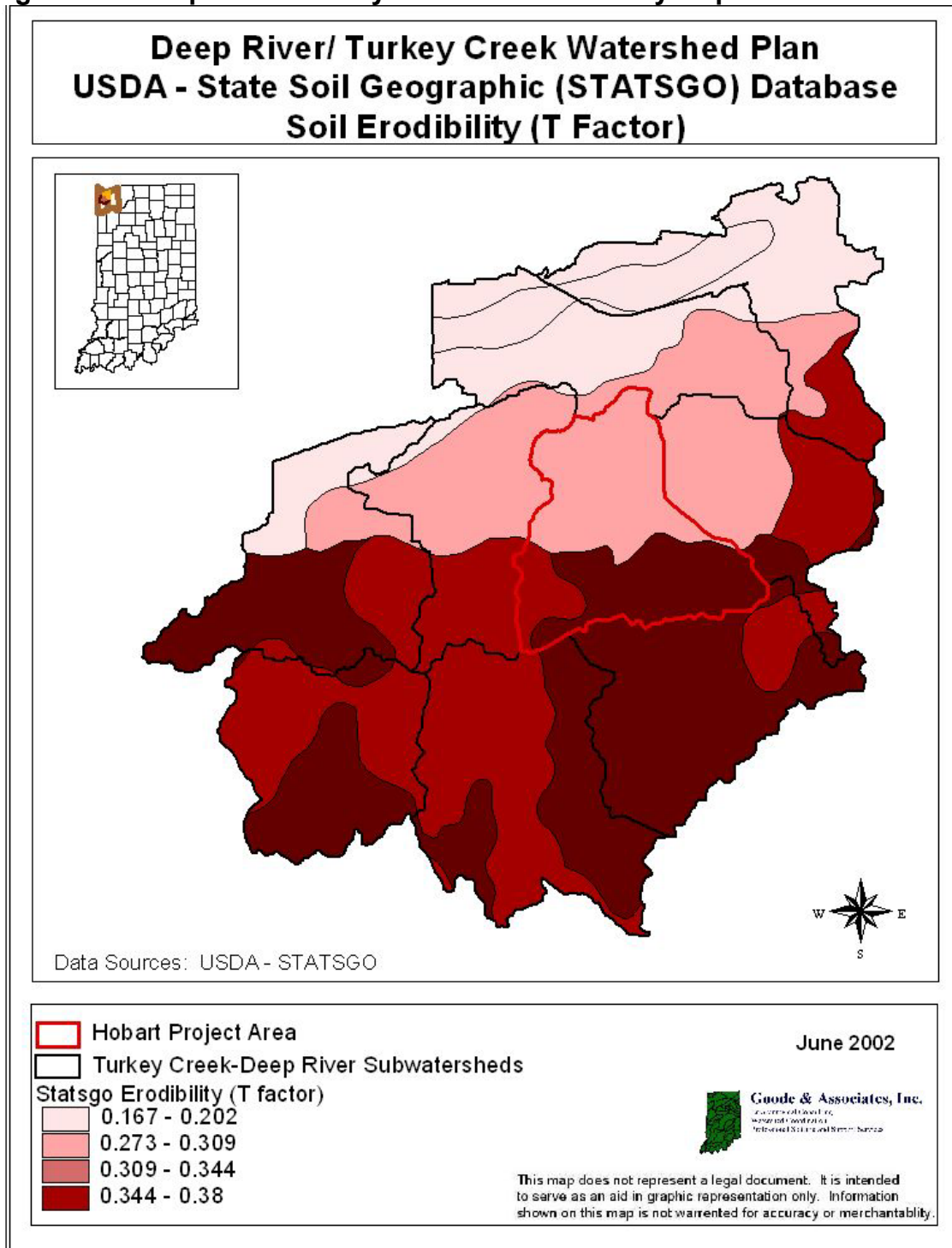
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lands (HEL) Deep River/ Turkey Creek watershed, HELs were digitized and mapped for the Deep River-Lake George subwatershed to fulfill contractual requirements of the City of Hobart's 319 grant. In all, the Deep River – Lake George subwatershed contains approximately 248 acres of HEL. Highly erodible lands in the Deep River-Lake George subwatershed are illustrated in **Figure 2-2)**

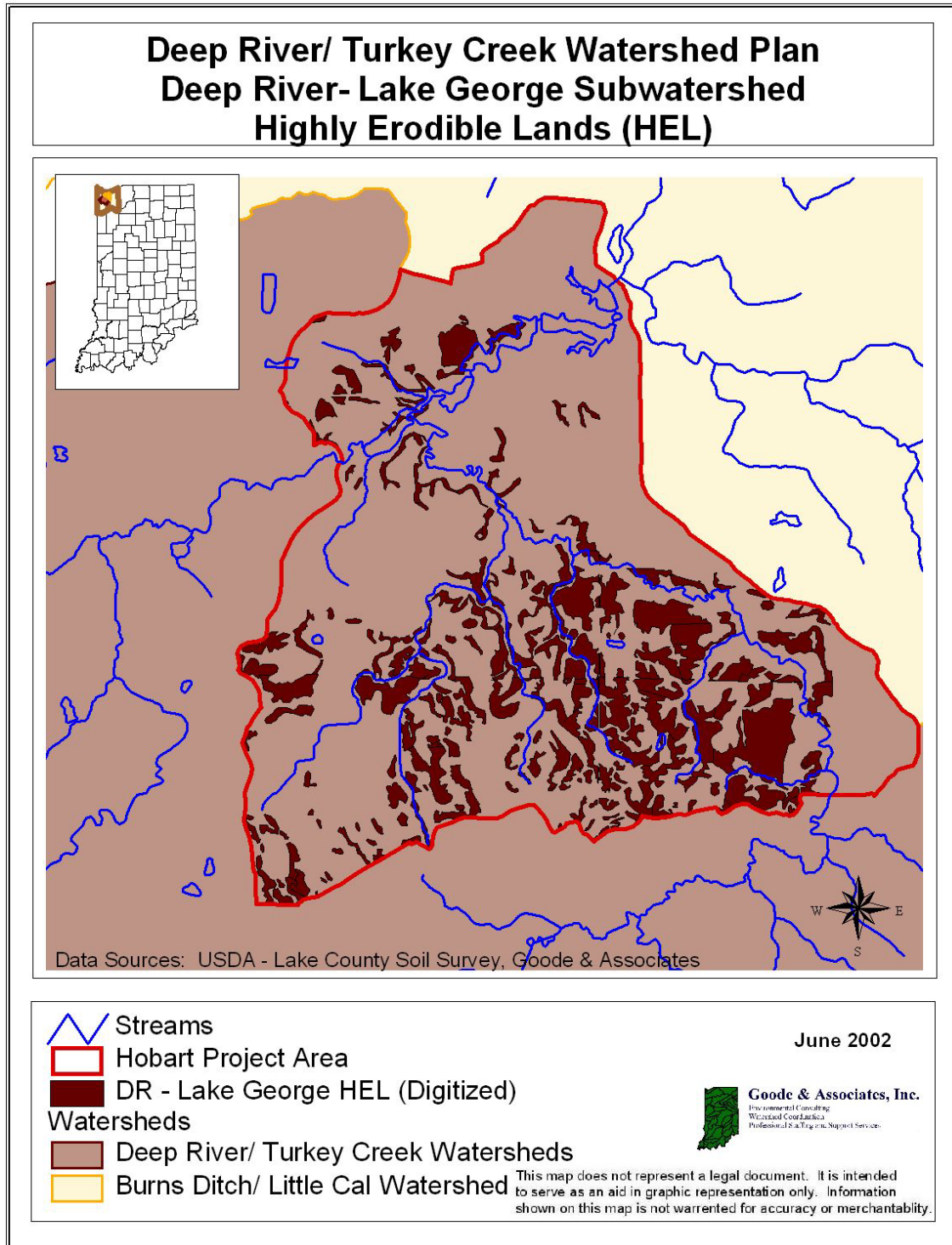
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**Figure 2-1: Deep River/ Turkey Creek Soil Erodibility Map**



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**Figure 2-2: Highly Erodible Lands in the Deep River - Lake George Subwatershed**



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## **Hydrology**

### **Surface Water**

Turkey Creek and its tributaries drain the northwestern part of the watershed into the upper end of Lake George. Deep River and its major tributaries, Beaver Dam Ditch and Niles Ditch, drain the southern and eastern parts of the watershed before flowing into Lake George. Deep River flows through Lake George and continues through Hobart, Lake Station, and the eastern portion of Gary, Indiana, draining the Deep River/ Turkey Creek watershed into Burns Ditch (**Figure 2-3**).

In addition to Deep River and Turkey Creek, the other significant water feature within the study area is Lake George, which is located within the City of Hobart. Lake George is a manmade lake that was created by the damming of Deep River circa 1840 by George Earle for a gristmill and community water supply. Today, Lake George is considered to be the central feature in the City of Hobart and has been the focus of significant downtown revitalization and economic development initiatives for the community.

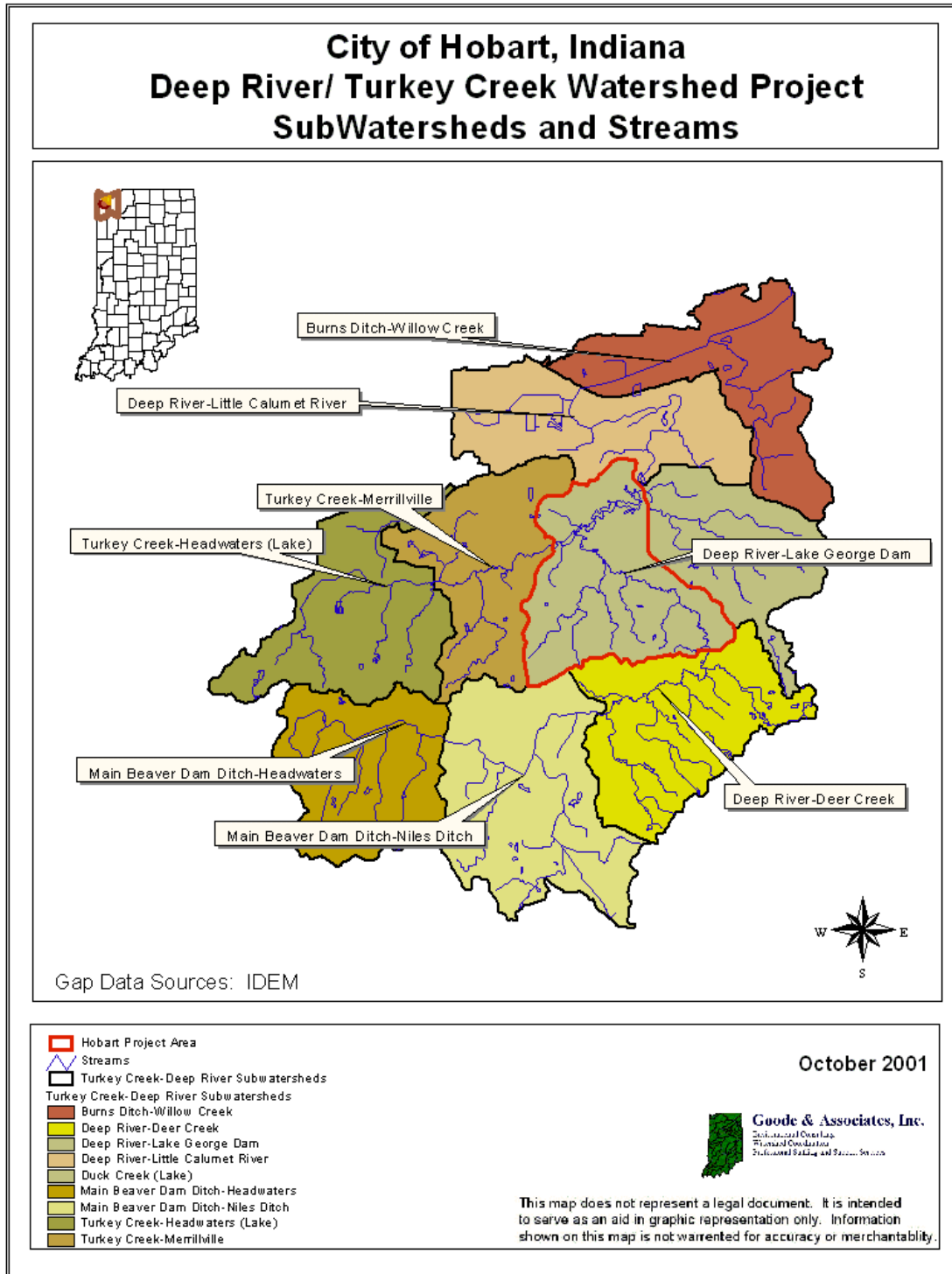
Lake George, as well as the majority of the City of Hobart, is located within the Deep River-Lake George Dam hydrologic unit (HUC 04040001030060), which covers approximately 12,879.1 acres in portions of Lake and Porter Counties in northwest Indiana. This HU is a subwatershed of the greater Deep River/ Turkey Creek watershed (HUC 04040001030), which encompasses approximately 79,433.7 acres.

### **Outstanding State Resource Waters (OSRW)**

In 1993, the Indiana Natural Resources Commission (NRC) adopted its "Outstanding Rivers" List for Indiana. This listing is referenced in the standards for utility line crossings within floodways, formerly governed by IC 14-28-2 and now controlled by 310 IAC 6-1-16 through 310 IAC 6-1-18. Except where incorporated into a statute or rule, the "Outstanding Rivers List" is intended to provide guidance rather than to have regulatory application (NRC 1997). To help identify the rivers and streams that have particular environmental or aesthetic interest, a special listing has been prepared by IDNR's Division of Outdoor Recreation. This listing is a corrected and condensed version of a list compiled by American Rivers and dated October 1990. The NRC has adopted the IDNR listing as an official recognition of the resource values of these waters. A river included in the "Outstanding Rivers List" qualifies under one or more of 22 categories. **Table 2-2** presents the rivers in the Deep River/ Turkey Creek watershed that are on the "Outstanding Rivers List" and their significance.

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**Figure 2-3: Subwatersheds and Streams of the Deep River/ Turkey Creek Watershed**



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**TABLE 2-2: Outstanding State Resource Waters in the Deep River/ Turkey Creek Watershed**

Name: Deep River
Location: Lake, Porter Counties
Description: From 1 mile south of U.S. 30 to Little Calumet River

### **Wetlands**

Wetlands are a significant hydrologic feature of northwestern Indiana, especially within the Deep River/ Turkey Creek watershed. Generally speaking, wetlands occur at points where ground water elevations exist at or near the ground surface, or where the ground is at least periodically covered by shallow water. Wetlands provide unique and valuable habitat for a variety of plants and wildlife.

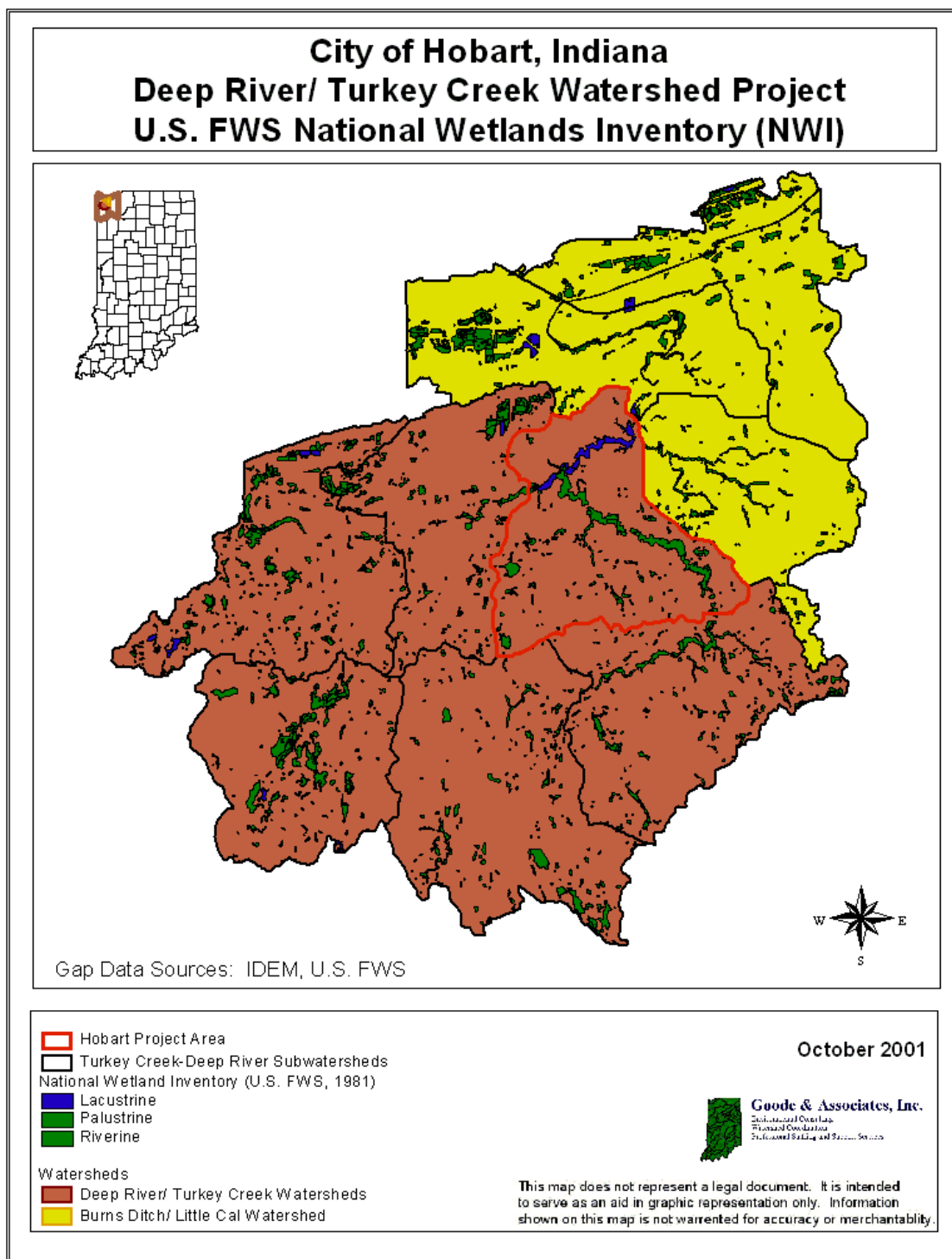
Wetland types in Indiana are typically categorized according to the classification system used by the U.S. Fish and Wildlife Service. This system of classification is hierarchical, progressing from general levels to more specific levels of classes and subclasses according to water regime (duration and frequency of flooding), water chemistry, soil type, and dominant plants or animals (Cowardin and others, 1979, 1982; U.S. FWS 1986).

According to this classification system, there are three predominant wetland systems in Indiana and the Deep River/ Turkey Creek watershed. Lacustrine wetlands include permanently flooded lakes or reservoirs of at least 20 acres, and smaller impoundments whose maximum depths exceed 6.6 feet at low water. Riverine wetlands are contained within a natural or artificial channel that at least periodically carries flowing water. Palustrine wetlands are associated with areas and/or shallow bodies of water which are usually dominated by wetland plants, including marshes, swamps, bogs, sloughs, or fens (Cowardin and others, 1979).

In 1981, the U.S. Fish and Wildlife Service, as part of its National Wetlands Inventory (NWI), initiated a comprehensive inventory of Indiana's wetlands. The NWI identified and classified wetlands based upon high-altitude aerial photographs, and then digitized the wetland information in a geographic information system (GIS) format. The wetlands identified via the NWI have been mapped and illustrated in **Figure 2-4**.

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**Figure 2-4: NWI for the Deep River/ Turkey Creek Watershed**



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Wetlands have historically been dredged and filled in conjunction with agriculture and urban development practices. In fact, the Indiana Department of Natural Resources (IDNR) has estimated that Indiana had lost 85% of its natural wetlands by the 1980's (DNR, 1996).

In addition to mapping the NWI areas for the Deep River/ Turkey Creek Watershed, the State Soil Geographic (STATSGO) database was used to map addition areas of hydric soils within the watershed. The Statsgo data set is a digital general soil association map developed by the National Cooperative Soil Survey. It consists of a broad based inventory of soils and nonsoil areas that occur in a repeatable pattern on the landscape and that can be cartographically shown at the scale mapped. The soil maps for STATSGO are compiled by generalizing more detailed soil survey maps. Where more detailed soil survey maps are not available, data on geology, topography, vegetation, and climate are assembled, together with Land Remote Sensing Satellite (LANDSAT) images. Soils of like areas are studied, and the probable classification and extent of the soils are determined (USDA NRCS, 1994). STATSGO data are designed for use in a Geographic Information System (GIS).

A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part of the soil. Identifying hydric soils is important for locating areas for potential wetland protection efforts, wetland mitigation, and development. Hydric soils in the Deep River/ Turkey Creek watershed are illustrated in **Figure 2-5**.

### **Significant Natural Areas/ Preserves**

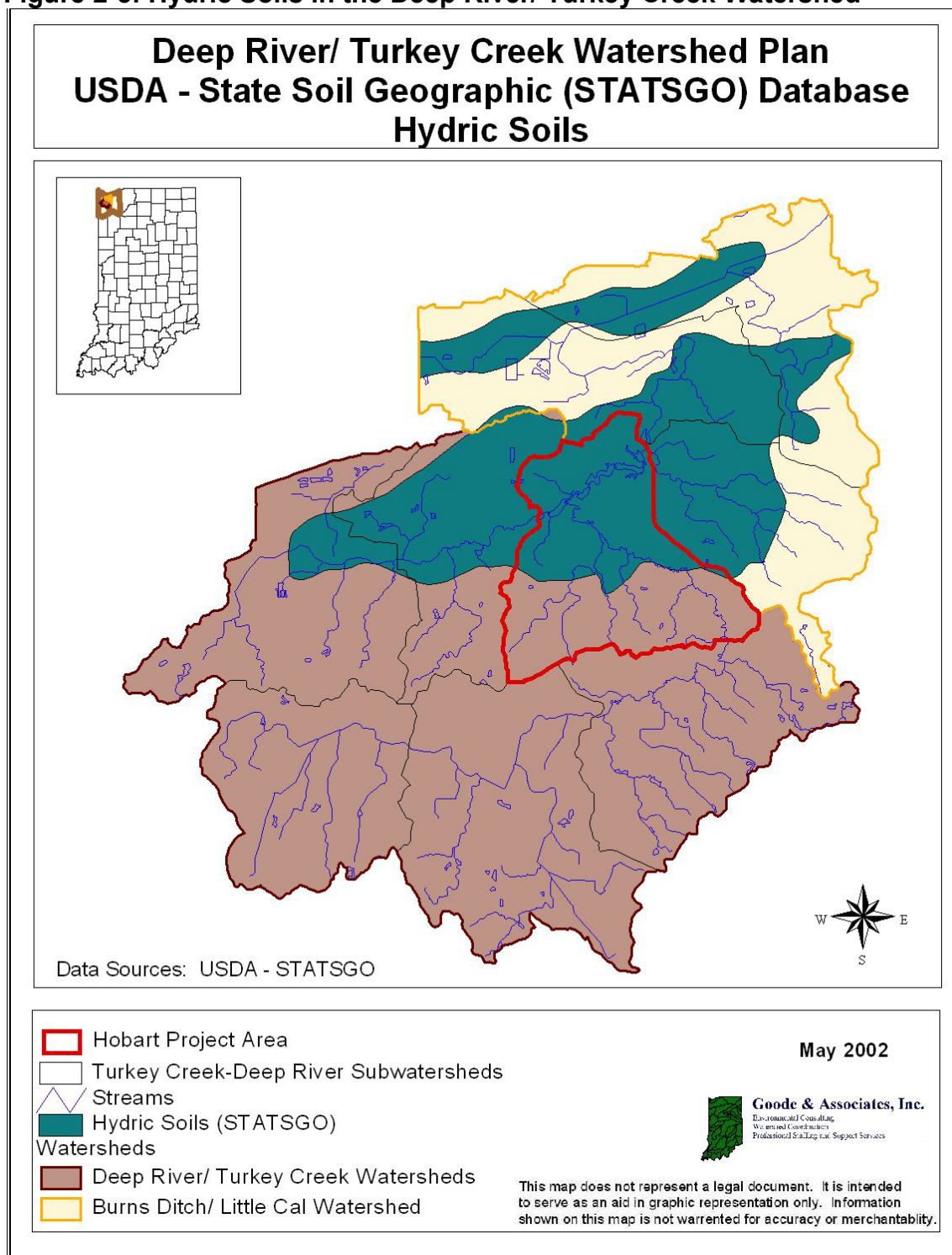
Although some of the original natural features of the Deep River/ Turkey Creek watershed have been lost to development, several significant natural features, such as the National Lakeshore and several smaller examples of the presettlement "prairie peninsula". These features are illustrated in **Figure 2-6**.

**Cressmoor Prairie Preserve** - Cressmoor Prairie is the largest protected example of a silt-loam or "black soil" prairie in Indiana. Black soil prairies were once the most common prairies in Indiana. However, their rich, fertile soil was among the very finest agricultural ground anywhere in the world, so most were plowed under for farming. As a result, black soil prairies are exceedingly rare.

Over 250 species of plants have been found at Cressmoor Prairie. Typical prairie species occurring here in great numbers include wild quinine, dense blazing star, rattlesnake master, prairie dock, and compass plant. Much of the preserve is typical of pure prairie habitat, with large stands of big and little bluestem, Indiana

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**Figure 2-5: Hydric Soils in the Deep River/ Turkey Creek Watershed**



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and other grasses interspersed with a wide variety of flowering plants. Cressmoor also has some savanna and low-lying wet areas. Amethyst aster was recently found in the savanna, making its first known appearance in Lake County, Indiana. American hazelnut is abundant in the transitional zone between Cressmoor's savanna and prairie.

The prairie wildflowers, including six types of goldenrod and blue and white varieties of aster, reach their peak in late summer and fall. But midsummer, when coreopsis, sunflowers, blazing star, ironweed, gray-headed coneflower, and eight species of milkweed are in bloom. Birds, butterflies, and small mammals and reptiles abound. Five rare remnant-dependent insects, including leaf hoppers, a skipper, and a butterfly, have been found in areas of Cressmoor with a history of fire.

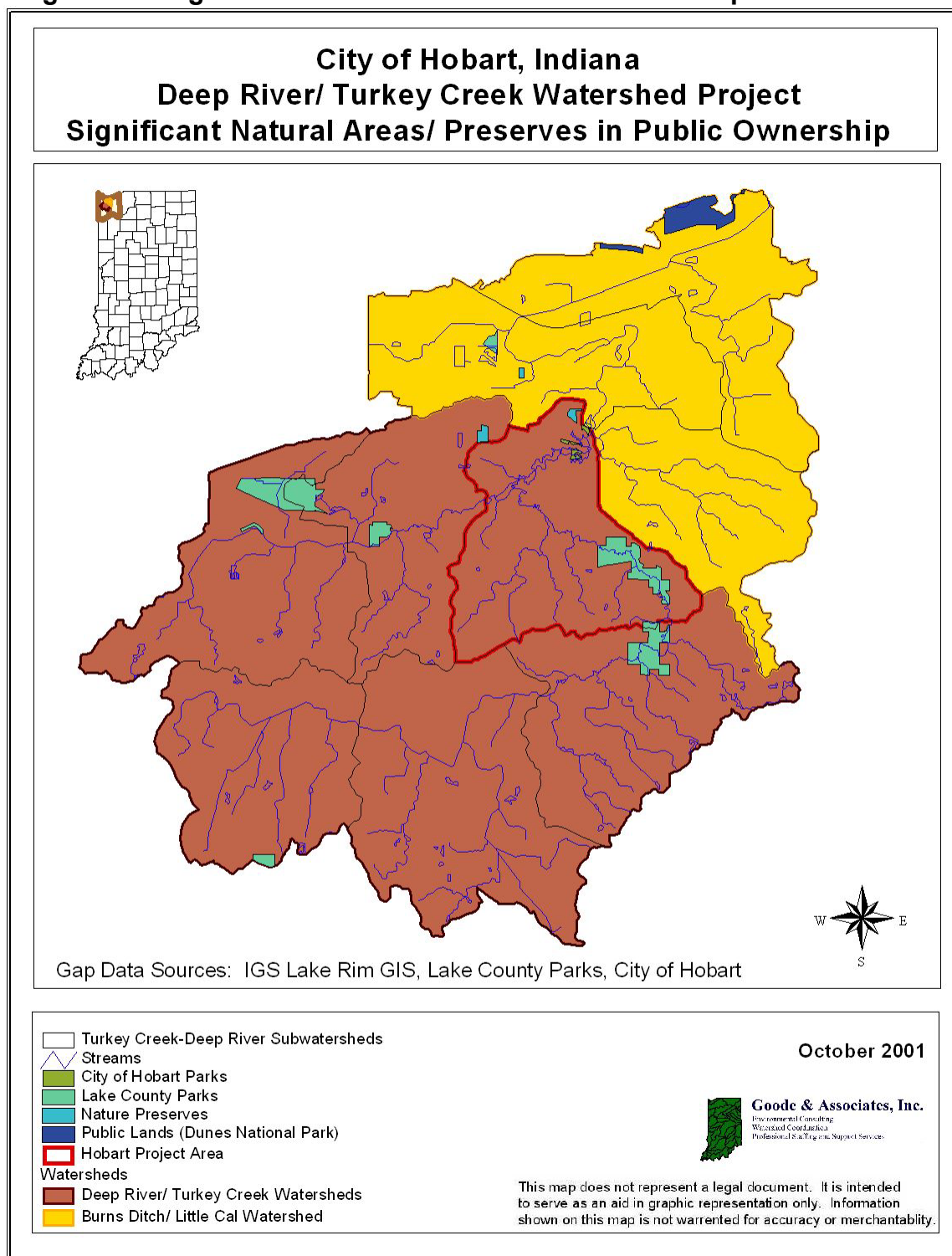
### **Lake County Parks**

Lake County Parks and Recreation Department (LCPRD) is dedicated to improving the quality of life in Lake County. The LCPRD has been actively pursuing opportunities to acquire, reclaim, and preserve natural systems and open space resources, and expand its recreational, cultural, and educational programs. The Deep River/ Turkey Creek watershed planning process has additionally highlighted the benefits to water quality from the acreage that the LCPRD manages along the rivers and streams in the Deep River/ Turkey Creek watershed. Oak Ridge Prairie, Turkey Creek Golf Course, Deep River, Oak Savanna Trail, and Erie Lackawana Trail are components of the over 2,500 acres of parkland that the LCPRD manages within the watershed.

These acres will become more important over the years as stakeholders in the Deep River/ Turkey Creek watershed and the LCPRD strive to improve water quality as waterbodies flow through and off of these parks. In addition to these sites, LCPRD is in the process of adding another 300 acres of nature preserves in the Lake George Watershed that will restore wetlands, prairie, savanna, and will become a model for future acquisitions in the watershed. The LCPRD hopes that other Northwest Indiana municipalities and governmental agencies around the Deep River/ Turkey Creek Watershed will take these same measures and help improve water quality in Lake County.

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**Figure 2-6: Significant Natural Areas in Public Ownership**



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## **Land Cover, Population, and Growth Trends**

### **Gap Analysis Program (GAP)**

The U.S. Geological Survey - Biological Resources Division and the U.S. Fish and Wildlife Service are overseeing the National Gap Analysis Program (GAP). In Indiana, Indiana State University and Indiana University are carrying out the Indiana GAP Project that involves an analysis of current vegetative land cover through remote sensing (ISU 2001). This analysis provides vegetative land cover data in 30 by 30-meter grids (See **Figure 2-7**). The following is a summary of vegetative cover in the watershed determined from the GAP image:

**Table 2-3: GAP Land Use Statistics**

<b>Land Use Type</b>	<b>Percentage of Watershed</b>
Agricultural vegetation (row crop and pasture)	61.17%
Urban (impervious, low and high density)	17.5%
Forest vegetation (shrubland, woodland, forest)	13.9%
Wetland vegetation (Palustrine: forest, shrubland, herbaceous)	6.4%
Open Water	1.0%
Insufficient Data	0.03%
<b>Total</b>	<b>100%</b>

### **Population and Growth Trends**

In the year 2000, the total population living within Lake and Porter County portions of the Deep River/ Turkey Creek watershed is estimated to be 107,000 persons, based upon Lake and Porter County 2000 population statistics. It should be noted, however, that these numbers do not reflect the exact population living in the Deep River/ Turkey Creek watershed. Population statistics were estimated using a simplified calculation dividing the population of each county by the percentage of the land area of the watershed within each county. The general statistics used for these calculations are listed in **Table 2-4**.

It is also interesting to note that the 2000 population statistics indicate a positive population growth trend for both Lake and Porter Counties between 1990 and 2000. Although the growth rate in Porter County is significantly higher (13.9%) than that of Lake County (1.9%), population increased 16,720 in Porter County and 49,377 in Lake County. Should this increase in population rate continue over the next decade, it would likely result in additional development that could have a negative impact upon water quality in the Deep River Turkey watershed via increased impervious surfaces and increasing quantities of stormwater runoff.

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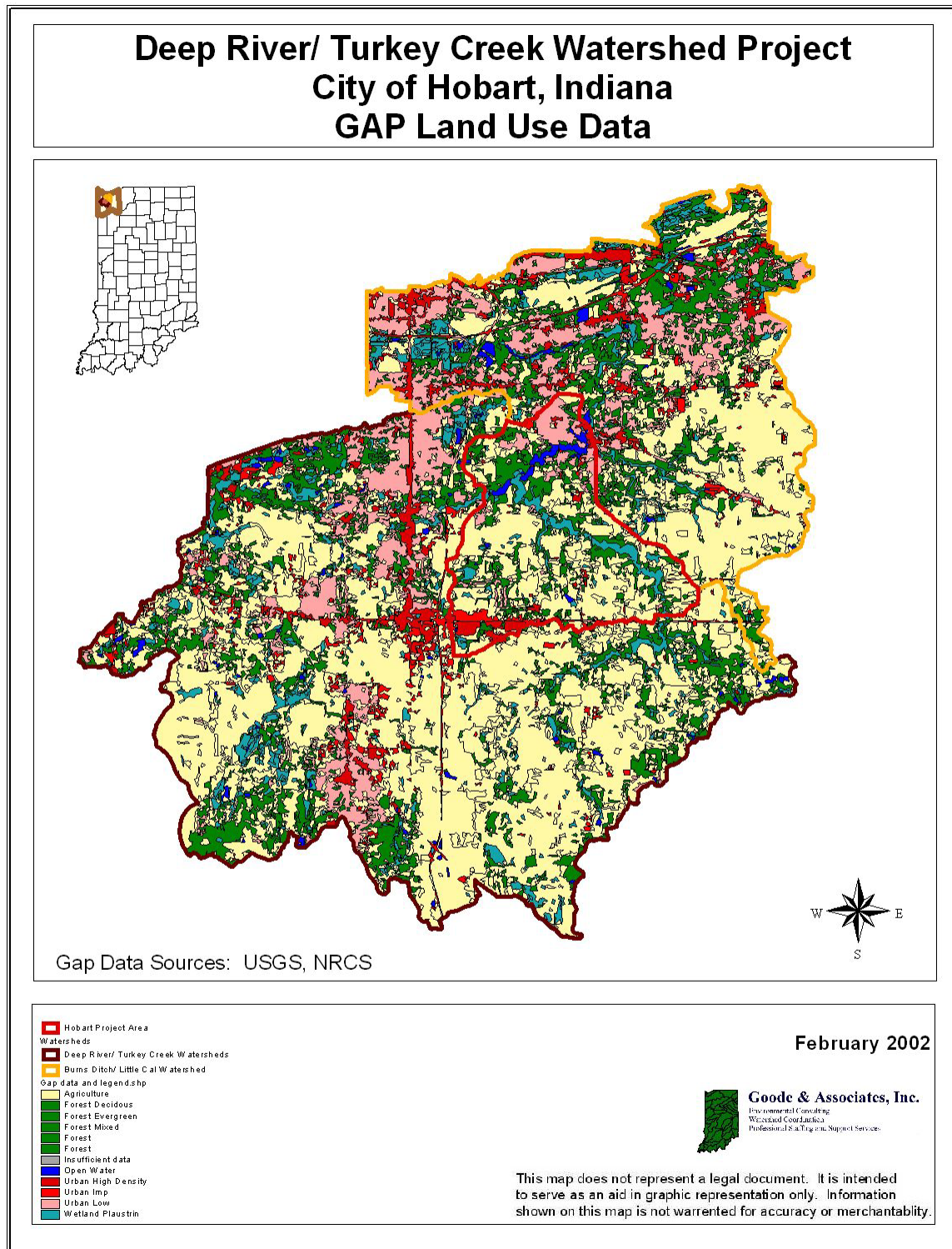
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Table 2-4: Deep River/ Turkey Creek Population Statistics, Census Bureau 2000

<b>Population Statistics</b>	
Lake County Population, 2000	484,564
Lake County Population, percent change, 1990 to 2000	1.9%
Porter County Population, 2000	146,798
Porter County Population, percent change, 1990 to 2000	13.9%
Lake County Acreage - DR/ TC Acreage	501 sq. miles/ 104 sq. miles
Porter County Acreage – DR/ TC Acreage	419 sq. miles/ 20 sq. miles
Estimated Population, Deep River/ Turkey Creek Watershed	107,595

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Figure 2-7: GAP Land Cover Map



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## **Natural Communities and Endangered, Threatened and Rare (ETR) Species**

The Indiana Natural Heritage Data Center database provides information on the presence of endangered, threatened, or rare species, high quality natural communities, and natural areas in Indiana. The database was developed to assist in documenting the presence of special species and significant natural areas and to serve as a tool for setting management priorities in areas where special species or habitats exist. The database relies on observations from individuals rather than systematic field surveys by the Indiana Department of Natural Resources (IDNR). Because of this, it does not document every occurrence of special species or habitat. At the same time, the listing of a species or natural area does not guarantee that the listed species is present or that the listed area is in pristine condition. To assist users, the database includes the date that the species or special habitat was last observed and reported in a specific location.

Results from the database search for the Deep River/ Turkey Creek Watershed are presented in **Appendix 2-1**. (For additional reference, a listing of endangered, threatened, and rare species documented in Lake County is included in **Appendix 2-2**). According to the database, a high quality community of wet floodplain forest existed in Lake County, just east of Merrillville in 1967. In 1978, Clay Street Kettle Woods, located in the southern portion of the watershed, supported three different high quality community types: dry upland forest, dry-mesic upland forest, and marsh. In 1989, Hobart Prairie Grove was home to a state endangered plant species, the smooth veiny pea (*Lathyrus venosus*). McCloskey's Burr Oak Savanna Nature Preserve, west of Hobart, supported two high quality community types in 1984: mesic prairie and mesic savanna. In the early 1990's, earleaf foxglove (*Agalinis auriculata*), a state endangered plant species, was identified within these natural communities.

Several endangered, threatened, or rare species and high quality natural communities recently or presently exist within the Lake George Watershed. The IDNR database documents the presence of a state endangered plant, earleaf foxglove (*Agalinis auriculata*) at a 31-acre prairie site located northwest of Hobart in 1999. The database also records the sighting of three state rare plants: forked aster (*Aster furcatus*), small purple-fringed orchis (*Platanthera psycodes*), and eastern jointweed (*Polygonella articulata*) on Van Buren Street, north of Hobart in the 1980's and 1990's. Database records show two high quality community types, wet-mesic wetland forest and upland mesic forest, in Deep River County Park in the 1970's and 1980's. These communities did, and still may, support a state endangered plant, highbush cranberry (*Viburnum americanum*), and a state

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rare plant, small purple-fringe orchis (*Platanthera psycodes*). A dry-mesic upland forest community existed, and still may exist, northwest of Hobart (T38N, R8W, Section 36). A high quality community, mesic prairie, presently exists at Cressmoor Prairie Nature Preserve. The bunchgrass skipper (*Problema byssus*), a state rare insect species, and several plant species including downy gentian (*Gentiana puberulenta*), small sundrops (*Oenothera perennis*), Leiberg's witchgrass (*Panicum leibergii*), and ladies' tresses (*Spiranthes magnicamporum*) inhabit the prairie. All of the plants species in the prairie preserve are state threatened with the exception of the ladies' tresses, which is a state endangered species.

Four state endangered bird species have also been reported in the Deep River-Turkey Creek Watershed near Hobart. In the 1930's, the loggerhead shrike (*Nycticorax nycticorax*) and king rail (*Rallus elegans*) were observed; the marsh wren (*Cistothorus palustris*) and black-crowned night-heron (*Nycticorax nycticorax*) were noted in the mid 1980's.